Monroe Township Middle School

Monroe Township, New Jersey

Geometry Preparation Packet

Middle School Geometry is a fast-paced, rigorous course that will provide you with the fundamental tools of geometric understanding that will support you in all future advanced mathematics courses. Since you will be taking Middle School Geometry after successful completion of Algebra I, the ***Monroe Township Middle School Geometry Preparation Packet*** contains review material of the algebraic concepts, skills, and procedures that should be mastered BEFORE entering Geometry in the fall. Essentially, this packet provides a review of the major algebra topics as well as a preview of geometric topics. The sections are based on the NJ 2016 Student Learning Standards.

Below are some online resources that you might find useful for extra review:

- http://www.khanacademy.org/
- http://www.ixl.com/math/geometry (free version)
- https://www.kutasoftware.com/free.html
- https://math-drills.com/

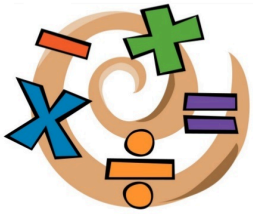
This preparation packet is the only formal review of the concepts, procedures, and skills that you will have before beginning your Middle School Geometry course. Your teacher will expect you to have mastered all topics included here. This collection of problems will identify those concepts that you have mastered as well as those you will need to practice and review. You are expected to seek extra help immediately on those concepts with which you have not demonstrated proficiency. Be resourceful – use the online resources!

SOLVE THESE PROBLEMS WITHOUT THE USE OF A CALCULATOR

&

SHOW ALL WORK

You will be responsible for handing in the completed packet with all work shown during the FIRST WEEK OF SCHOOL. The problems here are very representative of the types of items you will need to have mastered BEFORE Geometry… so we strongly encourage you to include this packet in your summer festivities! Good luck and enjoy! 😀



Linear Relationships

Write a linear equation to fit the stated requirements.

1. Write an equation of the line that passes through (-4, 1) and is ***parallel*** to $y = -7x + 3$.

Answer: _____

2. Write an equation of the line that passes through (5, -6) and is ***perpendicular*** to $y = 2x - 4$.

Answer: _____

3. Write the equation of the line that passes through (-2, -8) and (-1, 0) in ***slope-intercept form***.

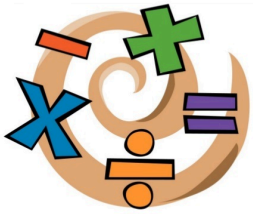
Answer: _____

4. Write the equation of the line that passes through (-3, 2) and (4, -1) in ***standard form***.

Answer: _____

5. Write the equation of the line that passes through (6, 2) and (8, -4) in ***point-slope form***.

Answer: _____



Linear Relationships

Solve each equation or inequality.

6. Solve $\frac{1}{3}(27x + 18) = 12 + 6(x - 4)$ for the value of x.

Answer: _____

7. Solve $\frac{x}{2} - \frac{x-3}{5} = 4$ for the value of x.

Answer: _____

8. Solve $5 < 4x - 11 < 13$ for the constraints on the values of x.

Answer: _____

9. Solve $|2x - 5| \leq 10$ for the constraints on the values of x.

Answer: _____

Solve for each intercept.

10. Determine the x- and y-intercepts of $3x - 4y = 9$.

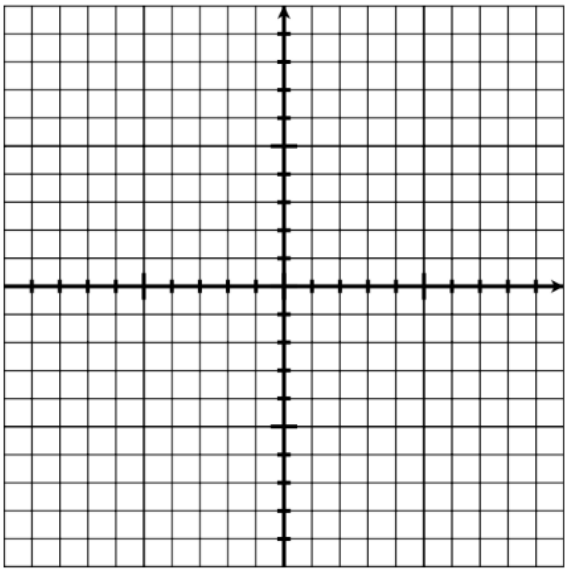
x-intercept: _____

y-intercept: _____

Systems of Linear Equations

Solve each system of linear equations.

11. Solve through graphing: $y = \frac{8}{5}x - 2$ and $x = 5$.



Answer: _____

12. Solve through substitution: $4x + y = -27$ and $y = 2x + 3$.

Answer: _____

13. Solve through elimination: $3x - 6y = 8$ and $\frac{9}{4}x - \frac{9}{2}y = 2$.

Answer: _____

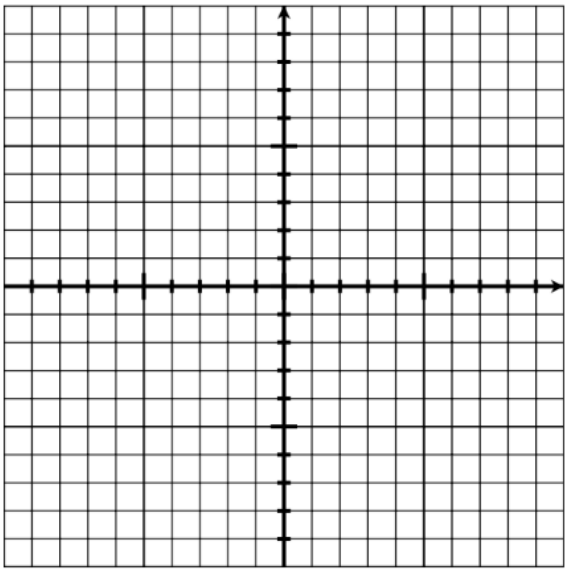
14. Explain how a system of linear equations can have no solution.

15. Explain how a system of linear equations can have infinitely many solutions.

Systems of Linear Inequalities

Graph each system of linear inequalities.

16. a) Graph $2x + y \leq 3$ and $x - 4y > -8$.

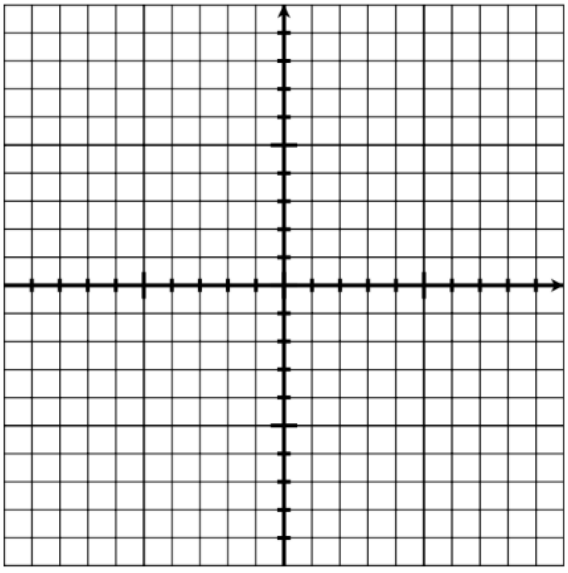


b) Is (0, 0) a solution to this system?

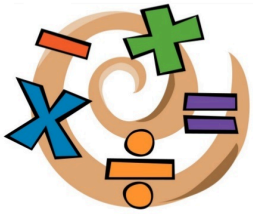
c) Is (-5, 1) a solution to this system?

d) Is (-2, 7) a solution to this system?

17. a) Graph $x \geq -3$, $y \leq 6$, and $x - y \leq 2$.



b) What is the area of the region which contains the solutions to this system of linear inequalities?



Exponents & Radicals

Simplify each expression.

18. $\left(x^{4}\right)\left(x^{9}\right)$ Answer: _____

19. $\left(-\ 3x^{-5}y^{6}\right)^{-2}$ Answer: _____

20. $\dfrac{21x^{8}yz^{3}}{7x^{4}y^{9}z^{3}}$ Answer: _____

21. $\sqrt{8}$ Answer: _____

22. $\sqrt{325}$ Answer: _____

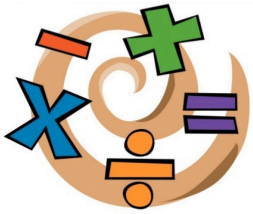
23. $\sqrt{3}+\sqrt{12}+\sqrt{20}+\sqrt{80}$ Answer: _____

24. $4\sqrt{3}\left(2\ +\sqrt{3}\right)$ Answer: _____

25. $\left(6\ -\sqrt{5}\right)^{2}$ Answer: _____

26. $\dfrac{8}{\sqrt{7}}$ Answer: _____

27. $\left(2\sqrt{6}\right)^{2}+\left(3\sqrt{2}\right)^{2}$ Answer: _____



Quadratics

Multiply each expression.

28. $(x - 5)(x + 3)$

29. $(3x - 4)^2$

30. $\left(x^2 + 6x - 8\right)\left(x - 6\right)$

Factor each expression.

31. $x^2 + 13x + 30$

32. $4x^2 + 12x + 9$

33. $5x^3 + 30x^2 + 40x$

Solve each equation through factoring.

34. $x^2 + 42 - 6x = 7x$

35. $6x^2 - 18x = 0$

36. $20x^2 - 10x = 100$

Solve an equation with the quadratic formula.

37. a) Solve $10x^2 - 11x + 3 = 0$.

b) Identify this quadratic's discriminant.

c) Explain the significance of this discriminant in terms of the number of solutions this quadratic has.

Quadratics

Solve for each intercept.

38. Determine the *x*-intercepts of $y = -x^2 - 6x + 40$.

Answer: _____

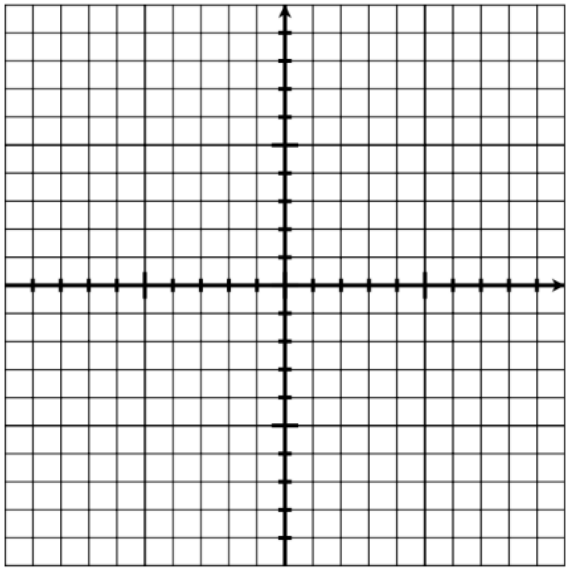
Solve for a vertex.

39. Find the coordinates for the vertex of $y = -\frac{1}{2}x^2 - x + 8$.

Answer: _____

Graph a parabola.

40. a) Graph $y = 2x^2 + 4x - 6$



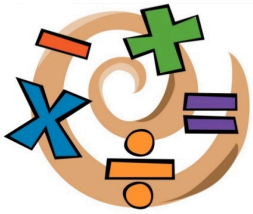
b) Identify the following features.

Axis of Symmetry: _____

Vertex: _____

y-intercept: _____

x-intercept(s): _____



Applications

Solve for each stated measure.

41. Find the perimeter and area of a rectangle with a length of $3\frac{3}{5}$ cm and width of $4\frac{1}{5}$ cm.

Perimeter: _____

Area: _____

42. If a square has sides of length 9 mm, what is its perimeter and area?

Perimeter: _____

Area: _____

43. Determine the circumference and area of a circle with a diameter of 11 in.

Circumference: _____

Area: _____

44. Solve for the circumference of a circle with an area of 36π cm^2.

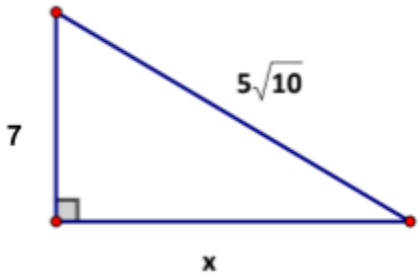
Circumference: _____

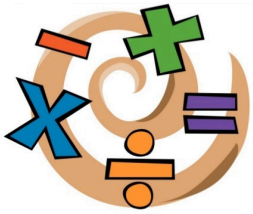
45. A square has a side length of 5 mm. What is the length of its diagonal?

Diagonal: _____

46. A right triangle has one leg length of 7 units, and a hypotenuse length of $5\sqrt{10}$ units. Determine the unknown side length.

Side: _____





Applications

Use the provided formulas to solve each problem.

47. The surface area of a cube can be found using the expression $6s^2$, where s is the edge length. If the surface area of a cube is 150 ft^2, what is the edge length?

Edge: _____

48. The volume, V, of a cone can be found using the formula $V = \frac{1}{3}\pi r^2 h$, where:

- r represents the radius of the base
- h represents the height

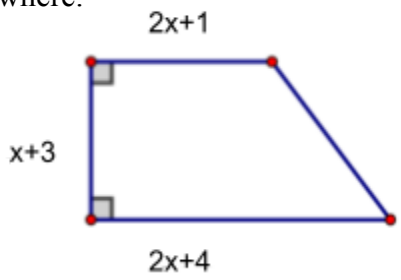
Write an expression for the volume of a cone with a height of 17 units and a radius of $2x$ units. Leave your answer in terms of π and x.

Volume: _____

49. The area of a trapezoid, A, can be expressed as $A = \frac{1}{2}h(b_1 + b_2)$, where:

- h represents the height
- b_1 and b_2 represent the bases

Write a trinomial to represent the area of the trapezoid shown.



Area:

_____

Use systems and quadratics to justify an answer.

50. Is it possible for a rectangle with a perimeter of 52 cm to have an area of 148.75 cm^2 ? Justify.

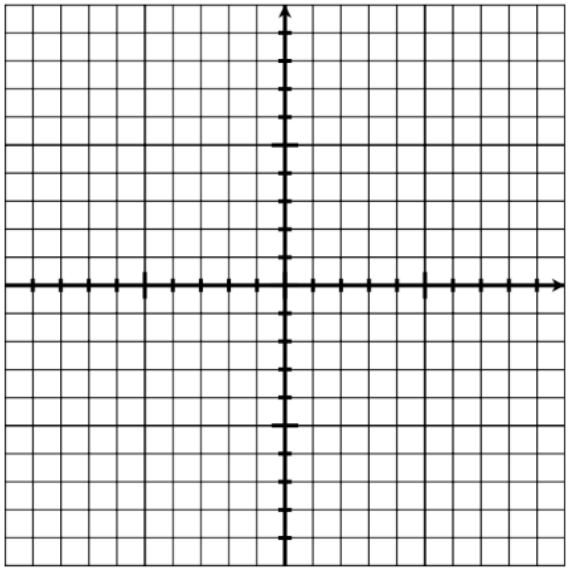
Applications

Determine if a quadrilateral is a rectangle.

Given: Quadrilateral *ABCD* has vertices *A*(-4, -1), *B*(-2, -5), *C*(4, -2), and *D*(2, 2).

Note: A rectangle is a quadrilateral with four right angles and both pairs of opposite sides parallel and congruent to each other.

51. a) Graph and label quadrilateral *ABCD*.



b) Find the slopes of all four sides.

Slope of $\overline{AB}$ =

Slope of $\overline{BC}$ =

Slope of $\overline{CD}$ =

Slope of $\overline{DA}$ =

c) Do these slopes support or reject *ABCD* being a rectangle? Explain.

d) Find the lengths of all four sides.

AB = *BC* =

CD = *DA* =

e) Do these lengths support or reject *ABCD* being a rectangle? Explain.

f) Make a conclusion. Is quadrilateral *ABCD* a rectangle?